

Mr. Smith's stations an excellent connection will have been made between the triangulations of the two coasts, and the delineation of the topography, the heights of passes, and other information accurately determined. In Westland Mr. G. F. Roberts, who has for several seasons been most indefatigable in the extension of a major and minor triangulation along the rugged West Coast from Hokitika southward, has succeeded in closing his triangles on the sides of the Otago and Canterbury triangulation in Makarora Valley, head of Lake Wanaka. The stations commanding the country from Haast River to Jackson's Bay and Cascade River are now in course of erection for next season's work. The further extension to join in with the Otago triangulation in Hollyford Valley will complete the correct survey of the coast-line from Waimangaroa to Martin's Bay, a distance of 280 miles. In Otago Mr. Wilmot has completed the connection between Martin's Bay triangulation and that of the Wakatipu District. This was an arduous work, involving much risk to life and limb, and was very well performed.

Mr. Farquhar completed a triangulation and topographical survey of the Dunstan Mountains satisfactorily, at the cost of only  $\frac{1}{4}$ d. per acre.

The detailed reports of the Chief Surveyors in the Appendix show that these surveys were all closed and checked to very narrow limits of error, notwithstanding the mountainous character of the country under treatment. The immediate object of these trigonometrical and topographical surveys is, for the North Island, principally the investigation of Native title, and in the Middle Island for the correct determination of run boundaries and to serve as starting-points for sectional surveys. But, apart altogether from these objects, the surveys are indispensable for the delineation of the main features of the country, and for that purpose alone are worth far more than their cost, which is under 1d. per acre for field survey and mapping to a scale of 2 inches to the mile.

#### RECONNAISSANCE SURVEY.

This, as the name implies, is a cursory examination of country, in which the surveyor, availing himself of mountain-peaks, landslips, and other conspicuous natural marks as stations, conducts a rough triangulation over the country explored, making notes and sketches as he proceeds. Mr. John Hay, District Surveyor, Southland, undertook last summer the exploration of the unknown mountainous district in the south-west of the Middle Island, and lying west of Hauroto Lake and Princess Mountains. The country, as will be seen from Mr. Hay's report and map in the Appendix, consists of a mass of mountains with long, narrow, deep valleys running out from the main range to the coast; each valley containing its lake or sound, the bed of an ancient glacier. This characteristic of the Southern Alps is wonderfully persistent, as exemplified in numerous long, narrow lakes, which run out from the east side of the great range, beginning in Canterbury close to the existing glaciers of Mount Cook, and continuing in an unbroken series to Lake Hauroto, a stretch of 240 miles. On the other side of the range the same characteristic is maintained in the occurrence of the West Coast Sounds. The country surveyed by Mr. Hay, although highly interesting from a physical point of view, unfortunately offers little or no inducement to the settler, the surface being too broken and steep for cultivation, and all under dense bush or scrub up to the limit of tree-vegetation, about 3,500 feet above sea-level. The area, mapped to a scale of  $\frac{1}{2}$  inch to the mile, is 850 square miles. It fills up a blank which long remained on the map of the Middle Island. The execution of the survey occupied four months. It was necessarily conducted under circumstances of great hardship and difficulty. The amount of work done is very creditable to Mr. Hay and his party.

#### TRANSIT OF VENUS.

The rare opportunity of observing the apparent passage of Venus across the face of the sun occurred on the morning of the 7th December, 1882. This, as is well known, is one of the few methods available for the determination of the distance of the earth from the sun. New Zealand being favourably situated for the observation of internal egress, it was selected by both the British and American Governments as one of their observing stations; Colonel Tupman, the leader of